APPENDIX II.

SECRETARIAT NOTE ON THE CONSTITUTION AND FUTURE WORKING OF THE INDIAN INSTITUTE OF SCIENCE.

The Institute of Science owes its origin to the benefaction of the late Jamsetji Tata and has an endowment consisting of immovable property in Bombay yielding an income at present of Rs. 1,25,000. It receives an annual grant of Rs. 50,000 from the Mysore Government. The grant from the Government of India is based on the principle of contributing one-third of the income from other sources, and the amount will not be less than Rs. 87,500 per annum, and may be increased under the provision of the vesting order to Rs. 1,50,000. The Government of Mysore have also given a free site and a building grant of 5 lakhs of rupees.

The Objects and Work of the Institute.

In the scheme sanctioned by the Government of India, the objects of the Institute are described as follows :—

"To establish chairs and lectureships in Science and Arts, especially with a view to the promotion of original investigations in all branches of knowledge and their utilisation for the benefit of India and to provide and to assist in the provision of suitable libraries, laboratories and all other necessary appliances."

This definition is wide enough to include the application of Physics and Chemistry to agriculture, arts, industry and medical science, philosophical, economic, archæological and other investigations.

As a matter of fact, the Institute has confined its work only to certain branches of the application of Physics and Chemistry to industry and agriculture chiefly, financial limitations rendering it impossible for it to extend the scope of its functions.

The work now done in the Institute may be classified as follows :—

(i) Investigation of chemical and other problems connected with the utilisation of raw materials and other resources of India for industrial purposes.

(ii) Training of students in advanced methods of research work and its application to industries. And

(iii) Assistance to industrialists in carrying on investigations and training men to be employed in such industries.

In pursuance of these objects, work in the Indian Institute of Science has been organised at present in two sections, *viz.*,

(i) Electro-technology, and (ii) Chemical section.

So far as work under (i) is concerned, the men trained had ordinarily no previous qualification in Engineering ; the majority of them have not turned into any high class of Electrical Engineers. The scope for training this class of men in the Institute is limited and as the Electrical Engineering faculties are likely to be established in all Engineering Colleges, it is proposed to close this section. This branch however, can do most useful work in solving questions regarding long-distance transmission of electric power and other problems relating to hydro-electric installations, the use of electricity as a direct manufacturing agent and application of electrolytic processes to industry.

As regards investigation of chemical and other problems, much credit is taken for the work done for the Mysore Government in starting the Sandalwood Oil Factories and the Soap Factory. It is not necessary to say much with regard to this claim. There is no doubt that some preliminary work was done in the Institute of Science, but the development of the industry is not due to the professors to any material extent. The professors moreover have shown themselves ignorant of the ordinary methods of tests of sandalwood oil and have done nothing to improve the original processes of manufacture. They have conducted certain investigations in wood-distillation, but the results are by no means complete. They

have also trained about a dozen and a half students for us, most of them as routine chemists of the Sandalwood Oil Factories. This cannot be regarded as an adequate return for the initial grant of a free site and a building contribution of 5 lakh of rupees and an annual grant of Rs. 50,000. Other industrial work done by the professors, excepting perhaps that done for the Indian Munitions' Board and that in which they have a direct commercial interest, is also not very important.

The Administration of the Institute.

The administrative arrangements in regard to the Indian Institute of Science are summarised briefly in paragraph 10 of the Resolution of the Government of India on the establishment of the Indian Institute of Science. "H. E. the Viceroy will be *ex-officio* Patron of the Institute and the heads of Local Governments Vice-Patrons. There will also be—

(*a*) A Court of Visitors on which the Government of India, the Government of Mysore and the Messrs. Tata and their heirs will each be represented by two members, the Messrs. Tata themselves being members during their lives. The Director-General of Education in India, the Directors of Public Instruction to the Local Governments, and the Director and the professors of the Institute will be *ex-officio* members. The Patron may appoint six members and the Vice-Patrons one member each. The Senates of the Indian Universities may each appoint one representative and the Council may appoint as members ten representatives of science and learning in India. Donors of capital sums of not less than Rs. 2,00,000 and contributors of not less than Rs. 15,000 annually for 5 years will be entitled to nominate members of the Court.

(*b*) A Council of 12 consisting of the Director and four professors of the Institute together with representatives of the Government of India, the Government of Mysore and of each of the Messrs. Tata and three nominees of the Court of Visitors.

(*c*) A Senate consisting of the Director and the professors *ex-officio*, with power to co-opt assistant professors and Readers.

(*d*) A Standing Committee of the Court of Visitors, consisting of 4 members of that body appointed by the Patron, by the Government of India, by the Government of Mysore, and by the Messrs. Tata respectively."

"The Council will be the executive body of the Institute, its proceedings being subject to review by the Standing Committee of the Court of Visitors. This Committee will have the power of reporting to the Patron, on the acts or proposals of the Council and the Patron may refer such report to a special committee and may afterwards make such order as may be necessary. The Senate will deal with all matters of an academic nature, so as to reduce to a minimum discussion on purely technical matters at meetings of the Council. The administration of the endowment properties in Bombay will be in the hands of a Board of Management which will be entirely independent of the governing bodies of the Institute itself. The Board will meet in Bombay and will pay the income received from the endowment properties to the Council to which body it will also render annual accounts."

According to the above constitution, the Council is the real executive body of the Institute being responsible for regulating and managing the expenditure of the Institute, the general organisation of work, the appointment of the staff, etc.

Appointments of professors are made on the recommendation of a committee nominated by the Council in England, two members of the committee being representatives of that branch of learning in which the appointment is to be made. The appointments are subject to the confirmation of the Patron (H. E. the Viceroy). Appointments on the teaching staff below the rank of a professor are made by the Council on the recommendations of the Senate, but are also subject to confirmation by the Patron.

Though the Council is the executive body of the Institute, its proceedings are subject to review by the Standing Committee of the Court of Visitors. A report giving an account of the work of the Institute for the previous session and of expenditure and of the budget estimates of the session, has to be sent by the Council not later than 6 weeks after the commencement of the first term of each session to the Patron, the Vice-Patrons and to each member of the Court of Visitors.

This report will be considered by the Standing Committee at a special meeting and they have the power to make recommendations thereon to the Council or Patron. (Rules 33 and 35). The Standing Committee has to be given previous notice of any extraordinary expenditure proposed to be incurred in any session and has the power to stop such expenditure until its objections are considered by the Patron and the expenditure is eventually sanctioned by him. The Standing Committee may also report to the Patron that any matter in connection with the Institute requires investigation or enquiry and the Patron will appoint a special committee to make the enquiry. The orders of the Patron on the reports of the special committee are final.

The principle upon which the Standing Committee seems to have been constituted is as follows:—

It is necessary to associate with the Institute a large body consisting of the representatives of the principal donors, nominees of the Government of India and of Mysore Government, the Director-General of Education, the Directors of Public Instruction in the various Provinces, representatives of Senates of the various Indian Universities and of science and learning. This body is known as the Court of Visitors. As it is too unwieldy to exercise any direct functions or control, a select Standing Committee consisting of 4 members of the Court of Visitors nominated respectively by the Patron, the Governments of India and Mysore and the Tatas has been appointed. The committee is more of the nature of a vigilance committee whose duty it is to bring to the notice of the Patron, who is the ultimate authority in all matters relating to the Institute, any irregularities in the administration or matters fundamentally affecting the Institute.

The natural result of this arrangement is either to place the Standing Committee in the invidious position of too much interference with the working of the Institute or make its functions ~~more or less~~ formal. The latter is what has actually happened. Unless, therefore, the constitution of the Standing Committee is materially altered, it can never exercise that wholesome influence over the working of the Institute, as contemplated, when the scheme was framed. The condition that members of the committee who are also members of the Council are not eligible to serve on the Standing Committee, though absolutely necessary if the Standing Committee is to exercise its functions of reviewing the work of the Council, has tended to lower its usefulness and reduce its functions to more or less those of a formal character. The representative of the Mysore State on the Council is usually the Dewan and its representative on the Standing Committee therefore has to be an officer of lower rank than him. At present it is the Vice-Chancellor of the Mysore University. It is doubtful if, under such conditions, he will take any lead in an action involving at times the criticism and impeachment of the proceedings of the Council.

The committee appointed in the year 1918 to report upon the re-organisation of the Institute have therefore suggested an alteration of the constitution of the Institute on the following lines:—

(*a*) The Institute should be under a Board of Control which will exercise its functions through a Director. The Board of Control should consist of representatives of what may be termed the vested interests, *viz.*, the Tata family, the Governments of India and Mysore and of any other Government or person providing funds beyond a certain limit. If more members are considered desirable they might be co-opted and some or all the Directors of Industries might be included. The duties of the Board of Control would include sanction to the budget and the making of all higher appointments.

(*b*) The final authority of the Governor-General of India in Council to be retained, but the arrangement whereby more or less nominal management vests in a Patron, Vice-Patron and a Court of Visitors to be abrogated, and the Standing Committee of the Council of Visitors which is rendered unnecessary by the changed constitution of the Board of Control, abolished.

(*c*) The Director would be solely responsible to the Board of Control for the general administration of the affairs of the Institute except in respect to the scientific and technical work and expenditure of funds allocated for the maintenance of the laboratories. In these matters, the affairs of the Institute should be under a staff Council of which the Director would be the President with an absolute veto on its proceedings when necessary, but involving presentation of the issues to the Board of Control.

The problem as to how to give sufficient autonomy to the executive body of the Institute while at the same time provide for some outside and independent scrutiny of its work, is by no means an easy one. Even with a Council, the Director and the professors have at present things in their own way. It is not desirable to do away with the reviewing body but its constitution should be so altered that its members should not feel any delicacy in exercising these functions and their standing and authority should be such as to enforce attention to their views. This body may consist of:—

(*a*) A representative of the Government of India of sufficiently high status,
(*b*) A representative of the Government of Mysore,
(*c*) A representative of the Tatas,
(*d*) A representative of the Local Governments or Native States who contribute not less than Rs. 25,000 per annum to the revenues of the Institute.
(*e*) A representative conjointly of other donors of a capital sum of not less than Rs. 20,000 or an annual payment of not less than Rs. 15,000 for a period of not less than 5 years.

The Council consists now of the Director, professors of the Institute not exceeding four in number nominated by the Senate, one representative of the Government of India, one representative of the Government of Mysore, two representatives of the Tatas and three nominees of the Court of Visitors, or 12 members in all. In other words, out of a total number of 12 members, the Tatas have 2 representatives, the Governments of India and Mysore, the two largest contributories one member each and the number of professors in the Council is equal to the total number of representatives of the Governments and the original donors who are responsible practically for the total endowment, thus giving to all intents and purposes, a decided majority on all important questions to the academic element in the Council. The size of the Council may therefore be reduced with advantage. There is no need to have such a large number of professors on the Council. It is sufficient if the Director is a member. Nor also is there any need for such a large number of nominees for the Court of Visitors.

The number of members of the Council may be fixed at *six*.

(i) One representative of the Government of India,
(ii) do Mysore State,
(iii) Two representatives of the Tatas,
(iv) The Director,
(v) One nominee of the Court of Visitors.

The members of the Council representing particular interests may be given the power in any important matter in which they think that the decision is not consistent with the general interests of the institution or adverse to the interests they represent, to ask for a reference to the Governor-General in Council. If such a power is given, there may be no need for another supervising body, and the special Standing Committee referred to above, done away with.

The Director is at present the chief administrative officer of the Institute. The functions of the Council are at present generally confined to the passing of budget estimates, sanction to new expenditure, appointments and settling questions of policy or principle. In all administrative matters, the Director has a free hand in managing the Institute so far as its ordinary work and the direction of scientific and technical work are concerned. The Council should be reconstituted with less academic element in it so as to have a determining voice in the settlement of lines of research to be followed and the methods of investigation employed.

There has been considerable discussion as to whether the Director should be a purely administrative officer with wide Indian experience who is not actively engaged in research work or a scientist brought out from England who will be able to direct the research work also to a certain extent. There is no doubt something to be said in favour of a Director not having any research work to interfere with his administrative duties, but at the same time it must be admitted that purely administrative work cannot occupy the whole time of a man who has to be paid on such a large scale as the Director and he must be a man, though not necessarily a Chemist, capable of determining the most useful line of research to be followed with reference to industrial problems and dealing with the economics of industry.

Future Work.

The chief reasons for the comparative poverty of results so far attained are:—

(*a*) The selection of subjects has not been made on any definite principles nor has each subject been continuously pursued till some final commercial results have been obtained; and

(*b*) as the professors have been allowed to take private work they have given precedence to this work; nor have they made public any important discoveries or inventions made by them likely to lead to commercial results.

With a view to organise a Chemical Service in India, the Government of India recently appointed a Chemical Services Committee and their proposals are under the consideration of the Government of India. The scope of the work of the Indian Institute of Science will be greatly modified if the proposals of the Chemical Services Committee are given effect to. The gist of these proposals is:—

To establish Provincial Research Institutes under each Local Government to carry out experiments in new chemical industries suited to the Province; to develop and place on an industrial scale industries which have been previously worked out in the laboratory and to carry out such other work as may be necessary to establish and foster new industries peculiar to the Province. There will be a Central Institute, which will keep itself in touch with the development of scientific industries throughout the world, to devise and co-ordinate the work of the Provincial Research Institutes and assist them in the solution of problems of a fundamental character and of basic importance.

The question of making the Indian Institute of Science itself the Central Chemical Institute was considered by the committee but the proposal could not be carried out as the authorities of the Institute are unwilling to transfer it entirely to the control of the Government of India. This is regarded as an essential condition of transfer as the Central Institute has to exercise a certain amount of jurisdiction over the Chemical Services and the Provincial Institutes.

Much of the work now done by the Indian Institute of Science will therefore be taken up by the Central and Provincial Research Institutes when established. The Indian Institute of Science, so far as experiments in industries are concerned, will have to leave investigations associated with existing industries to localities in which they are carried on and confine itself to industries of special importance to parts of India having no separate Research Institutes of their own and to the general and more basic problems of advantage to industrial development in India as a whole.

As the Government of India and the Tatas are most directly interested in the work of the Institute they may be expected to see that the work of the Institute is defined in such a manner as to be of the greatest value in training the people in research methods and achieving results of fundamental importance. We have chiefly to see therefore that its character is not modified so as to make its work more vague and indefinite and that we get greater assistance from the Institute in the investigation of local problems.

The constitution of the Council should be so modified as to allow the Government representative sufficient voice in the administration of the Institute and he should have the power, in case he is overruled in any matter of fundamental importance or one affecting the interests of the Government, to refer the question to the decision of the Governor-General in Council.

As regards assistance to the State in developing industries, the following measures may be adopted:—

(*a*) Problems of industrial importance to the State should be referred systematically for investigation to the Institute who will be bound to give priority to such investigations and keep such officer as may be named by Government informed of the progress of such investigations. The help of a student will be given, if required, for any special investigation.

(*b*) The problems the Institute proposes to take up, such as, improvements in oil-pressing and refining, preparation of high grade edible oil, wood-distillation, utilization of minerals exported in the raw form, manufacture of chemicals, etc., are usually such as have a direct interest to the State. Arrangements may be made in such cases for the Government to be supplied with information as soon

as the experiments reach a stage in which the results may be tested under manufacturing conditions and they should have the first option for taking over the development of industries for which facilities are available within the State.

(*c*) At least half-a-dozen students belonging to the State should be trained in the Institute every year and it may be advantageous to have one student under training under each professor engaged in any branch of investigation with a possibility of industrial development within the State.

(*d*) Assistance should be rendered, under the usual conditions, to private individuals who are qualified to investigate problems in which they are interested, to do so, and to be trained in manufacturing processes.

The professors should not be allowed to charge fees or enter into any arrangement with private individuals. Any fees received by them should be credited to the Institute and may be divided in a certain proportion among the staff but all professional services for Government work should be rendered free.